

## REMARKS

Claims 1-25 are pending in the present application.

Claims 26 and 27 have been canceled without prejudice.

Claim 1 has been amended to specify that the reaction products are cooled utilizing an excess of the halide vapor, an additional cooling gas, or a combination thereof.

Claim 18 has been amended to specify that the reaction products are cooled utilizing an excess of the chloride vapor, an additional cooling gas, or a combination thereof. Minor adjustments of the syntax of the claim were also made to simplify reference to the chloride vapor.

Support for these amendments can be found in the specification, e.g., on page 1, last full par.; page 2, 3rd full par.; and page 7, 1st par. No new matter is added by these amendments.

### **Claim Rejections - 35 U.S.C. §103(a).**

A. Claim 8 remains rejected under 35 U.S.C. §103(a) as being unpatentable over the Armstrong et al. '106 patent. Claim 8 is dependent on claim 7 and ultimately on claim 1. Since the Armstrong et al. patent depends on an excess of reductant metal to maintain the reaction products below the sintering temperature of the produced metal or alloy, and claim 1 is opposite to the teaching of the Armstrong et al. '106 patent, this rejection of claim 8 is untenable. The present invention utilizes an excess of the halide vapor or an external cooling gas to cool the reaction products below the sintering temperature, not an excess of the reducing metal. There is nothing in the Armstrong et al. '106 patent that would have led one of ordinary skill in the art to reasonably expect that the reaction products of the process could be successfully cooled by a gas

(i.e., excess halide vapor of an additional gas such as argon) and still maintain the reaction products in a particulate, unsintered state. To the contrary, processes known prior to the Armstrong '106 patent, such as the Kroll process and the Hunter process (described e.g., at col. 1, line 50 through col. 2, line 31 of the '106 patent) did not utilize excess liquid reducing metal to cool the reaction products, but also undesirably resulted in a sintered (i.e., fused) product. The Office Action does not explain why one of ordinary skill in the art would have reasonably expected that the suggested modification of the '106 patent would successfully cool the reaction products sufficiently to maintain the products in an unsintered state as required by the claims, especially in view of the known tendency of titanium halide reduction reactions to form fused products. As such, this rejection should be withdrawn.

**B.** According to page 2 of the Office Action, claims 9-16 and 19-25 remain rejected under 35 U.S.C. §103(a) as being unpatentable over the Armstrong et al. '106 patent in view of the Okudaira et al. U.S. Patent No. 4,902,341; in contrast, page 6 states that claims 10-12, 14-17 and 19-25 are rejected under 35 U.S.C. §103(a) as being unpatentable over the same references. The partially overlapping listings of the rejected claims is somewhat confusing, but for purposes of this response, Applicants assume that claims 9-17 and 19-25 are rejected over this combination of these references.

The applicability of the Armstrong et al. '106 patent to the present claims has already been discussed and it was shown that the present claims rely on a method of cooling the reaction products of the halide vapor reduction that is neither taught nor suggested by the Armstrong et al. '106 patent.

The Okudaira et al. '341 patent teaches a method of making titanium and its alloys in which the reaction products are in the molten state, see column 7, lines 8-9, column 7, lines 48-56, the paragraph bridging columns 8 and 9 as well as the paragraph bridging columns 10 and 11. The teachings of the '341 patent are directly opposite to the present invention since the reaction products there disclosed are all in a *molten* state whereas the reaction products of the present invention require that "...the particulate elemental material or alloy remain *unsintered...*", see claims 1 and 18 of the subject invention. The term "unsintered" means that the product metal particles are not fused together. In contrast, molten reaction products, as in the '341 patent, produce fused or sintered materials upon cooling. There is no explanation in the record as to why or how one of ordinary skill in the art would have been motivated to combine the teachings of these disparate references. In fact, there is no teaching or suggestion in the '341 patent, the '106 patent, or any combination thereof that an excess of the halide vapor or another cooling gas could have been *successfully* used to maintain the reaction products of the reduction reaction in an unsintered state. Withdrawal of the rejection is warranted.

C. Claims 1-9, 13, and 18 stand rejected under 35 U.S.C. §103(a) as being unpatentable over the Armstrong et al. '106 patent.

The inapplicability of the teachings of the Armstrong et al. '106 patent to claims 9-17 and 19-25 has been discussed above. The same arguments apply equally to claims 1-9, 13, and 18. Each of these claims also requires that the cooling of the reaction products be accomplished using an excess of the halide vapor or another cooling gas, and that the amount of reducing metal used is less than or equal to the stoichiometric amount needed to reduce the halide vapor.

The Armstrong et al. '106 patent teaches the desirability of utilizing an excess of the reducing metal to cool the reaction products. There is no teaching or suggestion in this patent that would have led one of ordinary skill in the art to reasonably expect that an excess of the halide vapor or an external cooling gas would have successfully cooled the reaction products of the highly exothermic reduction of the metal halide to maintain the reaction products in an unsintered state. Thus, withdrawal of this rejection is also warranted.

**Obviousness-Type Double Patenting Rejections.**

Claims 1-8, 10, and 18-23 stand rejected as being unpatentable over certain claims of the Armstrong et al. U.S. patent no. 5,779,761 on grounds of obviousness-type double patenting. The statements with respect to the differences between the subject claimed matter and the disclosure of the Armstrong et al. '106 patent also pertain, with equal force, to the Armstrong et al. '761 patent, and therefore, this rejection cannot stand and should be withdrawn. There is no teaching or suggestion in this patent that the reaction products of the metal halide reduction could be successfully cooled using an excess of the halide vapor or another cooling gas. Accordingly, withdrawal of this rejection is requested.

Claims 1-3, 6, 18, 21, and 23 have been provisionally rejected on grounds of obviousness-type double patenting over claims 1 and 28 of copending application Serial No. 10/530,775. Claims 1 and 28 of the above-mentioned copending application each require an excess amount of reducing metal in order to cool the products of the reaction. This patent application teaches away from the subject invention and cannot function as a provisional obviousness-type reference. In addition, no claims in the cited application have yet been issued

or even allowed.

All matters having been attended to, it is respectfully suggested that this application is in condition for allowance and such action is requested.

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Respectfully submitted,

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